

Agricultural Power and Equipment

Course Description: Agricultural Power and Equipment includes basic information and laboratory activities on small engines, tractors and agricultural equipment maintenance, repair and overhaul. The standards address competencies for electrical motors, hydraulic systems and fuel-powered engines.

Recommended Pre-requisites: Agriscience (HQ), Principles of Agricultural Sciences or Principles of Horticultural Sciences

Recommended Credit(s): 1 or 2

Recommended Grade Levels: 11th or 12th

Course Codes: (2009-2010) A10 – 5102 or A12 – 5152
(2010-2015) A12 - 5152

- * 1 denotes learning expectations that would be met when teaching the course one credit.
- ** All other learning expectations would be met when teaching the course for two credits.

Agricultural Power and Equipment

Standard 1.0

Demonstrate the safe use of agricultural tools and equipment.

Standard 2.0

Summarize the theory of engine operation.

Standard 3.0

Specify the correct use of precision instruments and basic tools to make settings on agricultural power equipment and small engines to manufacturer's specifications.

Standard 4.0

Evaluate troubleshooting techniques to assess engine failure problems.

Standard 5.0

Compare the characteristics and uses for a variety of fuels and lubricants.

Standard 6.0

Evaluate career opportunities available in agricultural power and equipment.

Standard 7.0

Integrate academic competencies in agricultural power and equipment.

Standard 8.0

Demonstrate premier leadership and personal growth needed for success and advancement in the career area of agricultural mechanics.

Standard 9.0

Prescribe the basic operation of agricultural machinery.

Standard 10.0

Relate engine components to various systems.

Standard 11.0

Read and interpret diagrams and schematics related to agricultural equipment.

Standard 12.0

Demonstrate electrical motor operation, maintenance, and application.

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Standard 1.0

Demonstrate the safe use of agricultural tools and equipment.

Learning Expectations and Performance Indicators:

- | | | |
|-----|---|---|
| 1.1 | Demonstrate the safe use of shop tools and equipment. | 1 |
| 1.2 | Specify the safety color codes used in a shop environment. | 1 |
| 1.3 | Differentiate the classes of fire and correlate them with the appropriate fire extinguishers. | 1 |
| 1.4 | Determine safety procedures to be used in a shop environment. | 1 |
| 1.5 | Complete a shop safety test with 100 percent accuracy. | 1 |

Standard 2.0

Summarize the theory of engine operation.

Learning Expectations and Performance Indicators:

- | | | |
|-----|--|---|
| 2.1 | Compare the difference characteristics of a motor and an engine. | 1 |
| 2.2 | Summarize the four-stroke cycle and the events that occur during each stroke. | 1 |
| 2.3 | Specify and explain the function of the basic engine parts involved in the four-stroke cycle engine. | 1 |
| 2.4 | Summarize the two-stroke cycle and the events that occur during each stroke. | 1 |
| 2.5 | Specify and explain the basic engine parts involved in the two-stroke cycle. | 1 |
| 2.6 | Distinguish between gasoline and diesel engines. | 1 |

Standard 3.0

Specify the correct use of precision instruments and basic tools to make settings on agricultural power equipment and small engines to manufacturer's specifications.

Learning Expectations and Performance Indicators:

- | | | |
|-----|--|---|
| 3.1 | Demonstrate the proper use of tools in making precision measurement. | 1 |
| 3.2 | Record and interpret data from precision measurements. | 1 |
| 3.3 | Demonstrate safe use of precision tools and equipment. | 1 |

Standard 4.0

Evaluate troubleshooting techniques to assess engine failure problems.

Learning Expectations and Performance Indicators:

- | | | |
|-----|--|---|
| 4.1 | Diagnose common engine problems and explain the cause and preventative measures. | 1 |
| 4.2 | Write an inspection customer report including parts and repair cost. | 1 |
| 4.3 | Categorize and explain prevention of major causes of engine failures. | 1 |

Standard 5.0

Compare the characteristics and uses for a variety of fuels and lubricants.

Learning Expectations and Performance Indicators:

- | | | |
|-----|---|---|
| 5.1 | Evaluate and explain the grades of diesel and their uses. | 1 |
| 5.2 | Evaluate and explain gasoline octane ratings and purposes. | 1 |
| 5.3 | Evaluate and explain lubricants by service, grade and function. | 1 |

Standard 6.0

Evaluate career opportunities available in Agricultural power and equipment.

Learning Expectations and Performance Indicators:

- | | | |
|-----|---|---|
| 6.1 | Research and prepare a written report on careers and jobs associated with agricultural power. | 1 |
| 6.2 | Specify training and skills needed for careers in agricultural power industries. | 1 |

Standard 7.0

Integrate academic competencies in agricultural power and equipment.

Learning Expectations and Performance Indicators:

- | | | |
|-----|--|---|
| 7.1 | Use current resources to research and write a report on modern improvements in agricultural equipment. | 1 |
| 7.2 | Apply appropriate grammar and spelling in filling out reports and forms. | 1 |
| 7.3 | Convert English/metric ratios. | 1 |
| 7.4 | Read instruments in metric and English. | 1 |
| 7.5 | Calculate ratios and percentages in basic shop skills. | 1 |
| 7.6 | Explain physical properties involved in combustion. | 1 |
| 7.7 | Explain basic hydraulic principles using Pascal's law. | 1 |
| 7.8 | Explain basic laws of electricity. | 1 |

Standard 8.0

Demonstrate premier leadership and personal growth needed for success and advancement in the career area of agricultural mechanics.

Learning Expectations and Performance Indicators:

- | | | |
|-----|---|---|
| 8.1 | Analyze careers in agricultural power and equipment. | 1 |
| 8.2 | Use FFA activities to develop leadership skills. | 1 |
| 8.3 | Develop a supervised agricultural experience program related to agricultural power and equipment. | 1 |
| 8.4 | Demonstrate proficiency in agricultural mechanics through FFA Career Development Events. | 1 |
| 8.5 | Prepare agricultural mechanic and power exhibits for displays. | 1 |

Standard 9.0

Prescribe the basic operation of agricultural machinery.

Learning Expectations and Performance Indicators:

- | | | |
|-----|--|---|
| 9.1 | Assess the routine maintenance procedures for safe and proper operation of agricultural machinery. | 2 |
| 9.2 | Specify and explain the functions of agricultural equipment. | 2 |
| 9.3 | Demonstrate the principles of restoring Agricultural equipment and prepare a written project report. | 2 |

Standard 10.0

Relate engine components to various systems.

Learning Expectations and Performance Indicators:

- | | | |
|------|---|---|
| 10.1 | Differentiate the parts and function of each engine system. | 2 |
| 10.2 | Specify the components and functions of hydraulic systems. | 2 |

Standard 11.0**Read and interpret diagrams and schematics related to agricultural equipment.**

Learning Expectations and Performance Indicators:

- | | | |
|------|---|---|
| 11.1 | Read and interpret hydraulic system schematics. | 2 |
| 11.2 | Read and interpret electrical schematics. | 2 |
| 11.3 | Read and use information from service manuals. | 2 |

Standard 12.0**Demonstrate electrical motor operation, maintenance, and application.**

Learning Expectations and Performance Indicators:

- | | | |
|------|--|---|
| 12.1 | Evaluate types of electric motors and their agricultural applications. | 2 |
| 12.2 | Analyze and explain the basic parts of an electric motor. | 2 |
| 12.3 | Perform an electric motor installation. | 2 |
| 12.4 | Specify and explain the procedures for maintaining electric motors. | 2 |
| 12.5 | Evaluate control systems using electric motors. | 2 |